

Selective dorsal rhizotomy for spasticity in cerebral palsy

1 Guidance

- 1.1 Current evidence on the safety of selective dorsal rhizotomy (SDR) for spasticity in cerebral palsy appears adequate; however, there is evidence of only limited efficacy. Therefore, the procedure should not be used without special arrangements for consent and for audit or research.
- 1.2 Clinicians wishing to undertake SDR for spasticity in cerebral palsy should take the following actions.
- Inform the clinical governance leads in their Trusts.
 - Ensure that patients or their parents/carers understand the uncertainty about the efficacy of this procedure, that it is irreversible and that there is a risk of serious complications. They should also be counselled on the extensive physiotherapy and rehabilitation required after this procedure and clinicians should provide them with clear written information. Use of the Institute's information for patients ('Understanding NICE guidance') is recommended (available from www.nice.org.uk/IPG195publicinfo).
 - Audit and review clinical outcomes of all patients having SDR for spasticity in cerebral palsy (see section 3.1).
- 1.3 Patient selection should be carried out in the context of a multidisciplinary team with specialist expertise in various treatment options for spasticity in patients with cerebral palsy. This should normally include a physiotherapist, a paediatrician, an orthopaedic surgeon and a neurosurgeon.
- 1.4 Further evidence on the efficacy outcomes of the procedure will be useful. The Institute may review the procedure upon publication of further evidence.

2 The procedure

2.1 Indications

- 2.1.1 Cerebral palsy is a general term for permanent brain disorders that originate during pregnancy,

birth or early life; 75% of patients have lower-limb spasticity. Cerebral palsy is associated with abnormalities of movement, balance and posture; there may also be language and visual difficulties.

- 2.1.2 Current conservative treatment options include oral medication, orthotic devices and physiotherapy. Electrical stimulation, intramuscular injection of botulinum toxin, corrective orthopaedic procedures, such as a tenotomy, and continuous intrathecal baclofen infusion are other treatment options.

2.2 Outline of the procedure

- 2.2.1 The brain nerve centres normally controlling muscle tone can be affected in cerebral palsy. Muscle tone in such patients greatly depends on a sensory-motor reflex arc between muscles and spinal cord nerves, causing the muscle to contract (that is, a spastic reflex). The aim of SDR is to downregulate this spastic reflex by reducing its sensory input.
- 2.2.2 SDR is a major surgical procedure performed on the lower spine. An incision is made along the lower back and a laminectomy is made in one or more vertebrae to uncover and then test the small nerve rootlets that make up the spinal sensory nerves. Usually three to five rootlets are identified and those that are found to have abnormal electromyographic responses intraoperatively are cut. All motor nerve rootlets are preserved so that leg movement is not affected.
- 2.2.3 Patients require intensive physiotherapy for 3–12 months after the procedure; patients who were previously able to walk may have to learn to walk again.

2.3 Efficacy

- 2.3.1 A meta-analysis of three randomised controlled trials comparing physiotherapy and SDR with physiotherapy alone found that, compared with physiotherapy alone, gross motor function

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This guidance is written in the following context

This guidance represents the view of the Institute, which was arrived at after careful consideration of the available evidence. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. This guidance does not, however, override the individual responsibility of healthcare professionals to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

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improved by an additional 4% with physiotherapy and SDR (8% and 4% improvements, respectively; $p = 0.008$). The follow-up period in the primary studies was 9–12 months.

- 2.3.2 In a non-randomised controlled trial of 61 patients undergoing SDR, injection of botulinum toxin type A or rehabilitation therapy, walking speed scores at 20 months' follow-up were not significantly different from baseline in any of the three groups. However, patients treated by SDR showed a significant but transient decrease in walking velocity at 3 months compared with baseline.
- 2.3.3 In a non-randomised controlled study, the measure of gross motor performance of 18 children undergoing SDR was found to have increased from 54.6 at baseline to 63.4 points at 2 years' follow-up. This was not significantly different from the improvement among children undergoing corrective orthopaedic surgery (54.1 to 60.7 points) ($p = 0.751$).
- 2.3.4 Two case series reported that median muscle spasticity scores (Ashworth scale) in adductor muscles decreased from 2 at baseline to 0 at 12 months' post-procedural follow-up among both walkers ($p = 0.007$) and non-locomotors (defined as non-crawlers and non-walkers) ($p = 0.001$), and from 2.9 to 0.4 points in a mixed cohort of children with spasticity at 4 years' follow-up. In another case series, 81% (169/208) of children showed improvements in ambulatory function at 12 months' follow-up. For more details, refer to the 'Sources of evidence' section.
- 2.3.5 A number of Specialist Advisers commented that there is some controversy about the role of SDR in relation to other management options for spasticity in cerebral palsy. They also commented that a reduction in spasticity does not always improve motor function.

2.4 Safety

- 2.4.1 A case series of 250 children (follow-up for at least 2 years in 49 children) reported that 58% (145/250) experienced severe postoperative pain and 40% (100/250) complained of dysaesthesia.
- 2.4.2 Common bowel and bladder complications reported were constipation in 20% (49/250) of patients, and urinary retention in between 5% (13/250) and 10% (20/208) of patients. Other less common but more serious complications reported were intraoperative bronchospasm in 5% (13/250) of patients, and postoperative aspiration pneumonia in 1% (2/208 and 3/250 in two different studies).

Ordering information

Copies of this guidance can be obtained from the NHS Response Line by telephoning 0870 1555 455 and quoting reference number N1140. 'Understanding NICE guidance' can be obtained by quoting reference number N1141.

The distribution list for this guidance is available at www.nice.org.uk/IPG195distributionlist

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Interventional procedures guidance makes recommendations on the safety and efficacy of a procedure. The guidance does not cover whether or not the NHS should fund a procedure. Decisions about funding are taken by local NHS bodies (primary care trusts and hospital trusts) after considering the clinical effectiveness of the procedure and whether it represents value for money for the NHS.

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- 2.4.3 In one case series, radiologically observed scoliosis was found in 6% (12/208) of children followed up for up to 4.2 years, although this was not considered to be functionally important. In another case series, periods of increased spasticity during times of increased stress, months or years after surgery, were reported in 40% (100/250) of patients who had undergone SDR. For more details, refer to the 'Sources of evidence' section.
- 2.4.4 The Specialist Advisers noted that adverse events included bladder and bowel disturbances, limb weakness, joint subluxation, progressive scoliosis or kyphosis, and sensory disturbance. Theoretical adverse events included paralysis, dividing the wrong nerve rootlets, hypotonicity, weight gain and death.

2.5 Other comments

- 2.5.1 The Committee noted that reduction of spasticity does not always improve mobility. Good case selection is important in order to avoid a deterioration in the condition.

3 Further information

- 3.1 This guidance requires that clinicians undertaking the procedure make special arrangements for audit. The Institute has identified relevant audit criteria and developed an audit tool (which is for use at local discretion) available from www.nice.org.uk/195

Andrew Dillon
Chief Executive
November 2006

'Understanding NICE guidance'

The Institute has produced information describing its guidance on this procedure for patients ('Understanding NICE guidance'). It explains the nature of the procedure and the decision made, and has been written with patient consent in mind. This information is available from www.nice.org.uk/IPG195publicinfo

Sources of evidence

The evidence considered by the Interventional Procedures Advisory Committee is described in the following document.

'Interventional procedure overview of selective dorsal rhizotomy for spasticity in cerebral palsy', February 2006.

Available from: www.nice.org.uk/IP318overview